

Translation of a Nutrition Literacy Assessment Instrument for Use in the Latino
Population of Greater Kansas City

BY

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Submitted to the graduate degree program in Dietetics and Nutrition and the
Graduate Faculty of the University of Kansas in partial fulfillment of the
requirements for the degree of Master of Science.

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Date Defended: April 28, 2015

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Abstract

Introduction: An individual's degree of nutrition literacy impacts their diet quality and overall health. Determining an individual's or a population's nutrition literacy can help registered dietitians and other nutrition experts tailor educational programs and materials to meet the educational needs of their audience. Latinos face disparities when it comes to health and health education. The purpose of this research is to translate and validate a nutrition literacy assessment tool for use among this population.

Methods: The Nutrition Literacy Assessment Instrument (NLit) developed by Dr. Heather Gibbs was adjusted to be culturally relevant for the Latino population of Kansas City and translated into Spanish. The NLit-S was reviewed by experts and tested using cognitive interviews in order to determine content validity and relevance to the target population. Finally, the reading level of the NLit-S was determined using the Fernandez-Huerta Readability Test.

Results: The content of the NLit-S was found to be valid and written at a reading level appropriate for the target audience.

Discussion: Assessment of nutrition literacy among the Latino population will allow health professionals to design nutrition education interventions that meet the needs of the population in the effort to reduce the risk of chronic disease development. Since there is no nutrition literacy assessment tool written and validated for use among Latinos, this research will attempt to close that gap by translating a valid instrument into Spanish and ensuring cultural validity for the target population.

Acknowledgements

To Dr. Heather Gibbs, my advisor both in academia and in life, thank you for all you have done for me this year.

To my esteemed committee members, Dr. Heather Gibbs, Rachel Barkley, and Dr. Paula Cupertino. Your guidance has been much appreciated.

To my amazing Translation Team, Liliana Abdulla-Martinez, Mitzi Ramirez, and Fabiola Hernandez. Your time and effort are what made this project possible, and for that I cannot thank you enough. I would have been lost without you.

To my Expert Reviewers, Rachel Barkley, Joe Hohendorf, and Bertha Mendoza, who provided wonderful advice during the development of this project.

Special thanks goes to the Frontiers Trailblazer Award, the grant that funded this research.

To Tom, with all the love I have. You have borne witness to my day-to-day stress and have dealt with my moods in the most gracious and supportive way possible. Thank you for your consistent encouragement and helpfulness, for making sure I was backing this document up electronically, and for sacrificing your time to make sure that I had what I needed in order to get it done. This year would have been far less joyful without you by my side.

To Mama, with my whole heart. I am more and more grateful for you with each passing day. You are my rock when I need one and my head when I lose it.

To my brothers, Sam and Russ, who I know support me in their own unique ways. I love you both.

And finally, to Daddy, in loving memory. I hope that I have become the woman you wanted me to be, in this and in the rest of my life. I feel you with me always.

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Chapter 1: Justification

The most published definition of nutrition literacy is “the degree to which individuals have the capacity to obtain, process, and understand nutrition information”(1). Rates of nutrition literacy are not well studied, however overall health literacy in the US has been determined to be relatively low. The National Assessment of Adult Literacy found that only 12 percent of American adults demonstrated “proficient” health literacy, 14 percent had “below basic” health literacy, and the majority, 53 percent, had “intermediate” health literacy (2). Many factors are believed to contribute to the degree of health and nutrition literacy, including age, gender, ethnicity, native language, education level, and socioeconomic status (2). The factors that influence health literacy are similar to those which influence health status, which leads to the idea that the two are linked.

Research has indicated that high nutrition knowledge (a component of nutrition literacy) is correlated with overall healthier eating patterns (3-5), which is especially significant when considering that many chronic illnesses, including type 2 diabetes and cardiovascular disease, have a significant relationship with diet.

Data has shown that Hispanic Americans have the lowest rate of health literacy (2). In addition, four out of the top five causes of death for Latinos are diet-related chronic diseases (6). A “traditional” Hispanic diet is often more nutritionally balanced than a typical American diet, which is high in fat, sugar, salt, and calories (7). But as immigrants adjust to American culture, traditional foods and diet practices are abandoned in favor of a more “American” way of eating (7-12). Some research suggests that migration status plays a role in abandonment of traditional eating habits, indicating that first-generation immigrants have better diet quality than second- or third-generations (7-10). Other research suggests that acculturation, or the abandonment of the

cultural practices of the home country in favor of those in the new country, plays a role in changing eating patterns (10-14). Evidence on this topic is mixed, however. Some of the studies indicate that a higher degree of acculturation correlate with poorer dietary habits (10-12), whereas others suggest that acculturation sparks beneficial dietary changes (13, 14). Further research on the effect of immigration on dietary patterns is needed to fully understand this connection.

Assessment of health and nutrition literacy is rare among healthcare practitioners. There have been a few tools developed for evaluation of certain aspects of nutrition literacy, such as label-reading skills (1), food groups and sources of specific nutrients (15, 16), and knowledge of food preparation methods (17). However, no single tool or questionnaire has been determined the “gold standard” for nutrition literacy assessment. In addition, there have been no nutrition literacy-specific tools developed for the assessment of Hispanic immigrant populations, although there has been one to assess overall health literacy (18). There is a significant gap in the literature regarding nutrition literacy among Latinos and more research is needed in order to determine how best to reach this population.

The purpose of this research is to determine how the Nutrition Literacy Assessment Instrument (NLit) can be modified to suit the needs of varying populations (19). The specific target population in the present study is persons of Mexican heritage, in order to represent the largest subset of the wider Hispanic population of the Kansas City Metro area.

The research question that forms the basis of this thesis project is as follows: What adjustments to the language and context of the NLit developed by Dr. Gibbs need to be made in order for the instrument to be relevant and valid for use in the Latino population? This question will be answered through the process of translation, review by experts, and pilot testing.

Chapter 2: Review of Literature

Background

What is nutrition literacy?

The concept of nutrition literacy evolved from the concept of health literacy, which first caught the attention of researchers in the mid-1990's (20). Health literacy was defined by the Institute of Medicine (IOM) and Healthy People 2010 as “the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions” (21). In his 2006 article, Dr. Baker explains that the concept of health literacy encompasses several individual factors: reading ability, which is a separate concept from the ability to read and understand health-related writing, prior conceptual knowledge of health topics, and the ability to speak about health topics (20). A similar definition and principles can be applied to the concept of nutrition literacy.

Definition

Nutrition literacy is defined as “the degree to which individuals have the capacity to obtain, process, and understand nutrition information” (1). This definition has obvious similarities to that of health literacy provided by the IOM, undoubtedly because nutrition and health are so closely related. Both general health and nutrition are complex subjects that tend to be difficult for a large part of the population to understand, which is why it is important to carefully educate patients and clients in order to provide them with the best basis for self-care.

Why is nutrition literacy important?

Nutrition literacy impacts health outcomes. According to a report by the National Assessment of Adult Literacy, self-reported health status and health literacy are directly correlated; the higher the person's perception of their health status, the more health literate they

tended to be (2). This makes intuitive sense: the more a person knows and understands about health, the more likely it is that they will lead a healthy lifestyle. However, this also provides an insight as to why health and nutrition education is important. Without education, we cannot expect our patients and clients to understand the concepts necessary to keep them in the best health. If understanding leads to doing, we must start with increasing health and nutrition literacy, especially considering the current statistics regarding Americans' health literacy levels.

Current level of nutrition literacy

Statistics on the current level of nutrition literacy are not available, but health literacy has been more widely studied. The National Assessment of Adult Literacy reported that the majority, 53 percent, of American adults have “intermediate” health literacy (2). Twenty-two percent had “basic” health literacy, 14 percent had “below basic” health literacy, and only 12 percent of American adults demonstrated “proficient” health literacy (2). Although these numbers are not directly reflective of the nation's nutrition literacy, health and nutrition are so closely linked that it can be assumed that the statistics would be similar. These statistics are concerning, especially considering the impact that health and nutrition literacy can have on dietary choices and patterns. Demographic analyses have determined that an individual's health and nutrition literacy is influenced by several factors.

Factors that influence nutrition literacy

The National Assessment of Adult Literacy found differences in the average health literacy across several different demographics (2). Health literacy differed among age groups, genders, ethnicities, native languages, education levels, and socioeconomic statuses (2). These demographic factors are similar to the ones that influence the development of chronic disease. It is well known that individuals with lower education and socioeconomic status are at greater risk

for developing chronic disease, usually related to poor diet and lack of physical activity (3). These similarities alone indicate that health and nutrition literacy are directly related to health outcomes and the prevention of chronic disease.

Nutrition literacy and dietary intake

Studies have shown a direct relationship between greater nutrition literacy and more healthful dietary patterns. Although many of these associations have been insignificant, Wardle and colleagues found that those with the highest level of nutrition knowledge were 25 times more likely than those with the lowest level of nutrition knowledge to consume recommended amounts of fruits, vegetables, and fat (4). Another association between nutrition literacy and dietary intake is that individuals with higher degrees of nutrition knowledge were more likely to consume a heart-healthy diet that decreases cardiovascular disease (CVD) risk (22).

Disease states related to nutrition literacy

Low nutrition literacy contributes indirectly to the development of preventable disease states, such as type 2 diabetes and heart disease. Successful management of chronic disease is largely controlled by the patient; adherence to medical and nutritional advice is key (5). In an Iranian study of hypertensive patients, it was discovered that those with uncontrolled hypertension were less likely to understand the effect of nutrition on the disease and were also more likely to experience negative or hopeless feelings about their disease (5). This finding can be applied to any disease that has a significant dietary component, such as diabetes and kidney disease. Patients with a higher degree of nutrition knowledge are more likely to feel that their disease is manageable and follow through with medical and nutritional advice. Therefore, improved nutrition knowledge, or literacy, improves self-efficacy and ability to make correct choices and thereby improves management of chronic disease.

Populations at risk due to poor nutrition literacy

The populations most at risk for poor nutrition literacy are similar to those who are at greater risk for the development of chronic disease. The National Assessment of Adult Literacy report found that the average health literacy among Hispanic Americans was the lowest compared to all other ethnic groups studied (2). In addition, the same report discovered that native English speakers demonstrated higher health literacy than adults who grew up in bilingual homes and those who grew up in homes where English was never spoken (2). This population deals with a number of the demographic influences; language is certainly an issue, especially among new immigrants, but Hispanic Americans often face disparities in regards to socioeconomic status and education.

Health status among Hispanic Americans

According to the Center for Disease Control and Prevention (CDC), Hispanic Americans totaled 50 million in 2010, or 16.7% of the US population (6). Due to high immigration rates, this number is expected to almost double by the year 2030 (6). Because of the rise in population, Latino health will be of great concern in the coming decades. Some data shows that Latinos are at higher risk for the development of health problems such as hypertension and type two diabetes. The CDC reports that the top five causes of death for this population are cancer, heart disease, unintentional injuries, stroke, and diabetes (6). Four out of five of these mortality causes are diet-related. That being said, another review found that life expectancy for Latinos was not very much different from US natives, but there were differences in life expectancy and disease rates between foreign-born and US-born individuals (23)

Life expectancy for foreign-born Latinos was, on average, 3 years longer than Hispanic-Americans born in the US (23). US-born Hispanic Americans were also about 12% more likely

to experience CVD-related mortality than their foreign-born counterparts (23). Length of time spent in the US seemed to play a role in chronic disease development as well. US-born Mexican Americans were more likely than “long-term immigrants” to develop chronic disease; of the groups, the more recent immigrants were least likely to experience these negative consequences (23). These findings lead to the conclusion that there is something about living in the US that is detrimental to the health of our immigrant populations, although exact identifications of that morbid factor are not identified by research.

Diet quality among Hispanic Americans

The traditional Latin American diet consists of frequent servings of fresh fruits and fruit juices, vegetables, beans or other legumes, starches, and meats such as chicken and pork. Studies have shown that when immigrants come to the United States and begin to integrate into the different culture, dietary patterns change to reflect that integration (7-12). Unfortunately, as the typical American diet is heavy in sugar, salt, and fat, this dietary integration involves the selection of less healthy foods, such as sweets, pre-packaged convenience foods, fried foods, and fast food menus. This change in food choices most commonly decreases the nutritional value of the overall dietary pattern of the immigrants who make these changes. Several studies have hypothesized when and why these changes occur, and they often have to do with the feeling of “belonging” in American culture.

Migration status

Migration status affects overall diet quality among Latinos. In 1995, Guendelman and Adams found that despite the fact that Mexican-American immigrants who were born in Mexico had lower socioeconomic status and self-perception of good health, their diets included higher intakes of protein, vitamins A and C, folic acid and calcium than their counterparts who were

born in the United States (7). In fact, these first-generation immigrants were more likely to consume the RDA for all of the nutrients studied, except iron, than second-generation immigrants and non-Hispanic Caucasian Americans (7). In a focus group among first-generation immigrants from Mexico, a common feeling among participants was that immigration to the US had a “negative impact” upon meal structure, i.e. types of foods eaten and meal schedule (8). Upon examination of NHANES III data and diet recalls in 2000, Dixon and colleagues found that overall nutrient intake profiles were more healthful among first-generation Mexican Americans than second-generation (9). This finding was very similar to that of Creighton and colleagues: Latinos born in Mexico were more likely to consume fruits and vegetables than US-born (10). These studies conclude that second-generation Mexican Americans are more likely to abandon the traditional Mexican diet, which includes fruits, fruit juices, vegetables, beans, and legumes, in favor of a more “Americanized” dietary pattern, which tends to be higher in saturated fat and sodium and lower in produce. This finding was consistent to most of the subjects studied despite degree of acculturation, or the abandonment of the native culture in favor of the new culture.

Acculturation

Dietary patterns can also be a signal of belonging to a certain culture or population. A 2011 study by Guendelman and colleagues examined whether reported food preferences of a group of immigrants would change when they felt that their identity as an American was questioned (11). In this study, a researcher would “threaten” Asian-American participants’ American identity by asking whether they spoke English, then participants would report their favorite food, which was categorized as “Asian” or “American” (11). The study found that the Asian-American participants whose identities were threatened were significantly more likely to

report an “American” favorite food than were the participants whose identities were not threatened (11). The study further revealed that Asian-American immigrants whose identities were threatened ordered and ate “Americanized” meals, accumulating 190 calories and 12 grams of fat more than their counterparts who remained unthreatened, who tended to order and eat more traditional Asian dishes (11). Whereas traditional Asian diets are generally balanced and healthy, the typical American diet is heavy with sweets, saturated fat, and processed foods; immigrants’ daily tendencies to adjust their diets to fit in with the general American population leads to a turn for the worse in their overall diet quality.

Guendelman and colleagues’ findings are consistent with findings seen in more recent studies. Earlier this year, Wiley and colleagues found a similar relationship between dietary pattern and degree of acculturation (12). This study revealed that Latina mothers who were more acculturated to the United States were more likely to serve their children less healthy diets, and those children were consequently more likely to have higher BMI’s than the children of less acculturated women (12). Furthermore, Creighton’s research indicated that “linguistic acculturation,” the degree to which English is spoken on a regular basis, was negatively correlated with intake of fruits and vegetables and positively correlated with obesity rates (10). However, it is important to note that Creighton also detailed the effects of higher socioeconomic status: immigrants with more resources were more likely to eat a healthful and balanced diet (10). Here is highlighted the interplay of socioeconomic status, migration status, and acculturation, suggesting that the three play simultaneous roles in affecting overall dietary patterns of immigrants to the United States. These roles are complex and involve not only the individual’s “American identity,” but also personality traits, preferences, and familial and social influences.

However, not all studies show negative effects of acculturation. The effects of globalization on food culture has been pronounced in recent decades, marked by a stark increase in fast food restaurants, street vendors, and processed foods available at supermarkets in developing countries. In a study involving immigrants who moved to the US from Latin American and South American countries after 1999, participants reported regular consumption of processed and fast food even before moving to the United States; one participant even reported that her favorite restaurant in all of Honduras, her home country, was Pizza Hut (13). One barrier to regular consumption of fresh fruits and vegetables, as Latin Americans perceive, is that much of the produce grown in their native countries is produced for exportation, and as a result, natives are more apt to choose processed and fast foods (13). This research also illuminated the “transnationality” of nutrition information and indicated that fad diets are not uncommon in Latin American and South American countries (13). Some people who migrate to the US from Hispanic countries even become healthier than they were in their native country (13).

Martínez indicated that some immigrants, upon moving to the US, curbed their consumption of salty snacks, fast foods, and soft drinks and adopted instead more balanced and varied dietary patterns (13). Some other studies have found similar results. In a 2012 Massachusetts study of Puerto Rican immigrants, higher levels of acculturation were associated with less central adiposity, better self-perception of health, and some improvements in diet quality compared with less acculturated subjects (14). In this study, dietary improvements were significant only among participants above the poverty line, but included increases in fruit and non-starchy vegetable intake and decreases in starchy vegetable and refined grain intake (14). This research indicates that acculturation alone cannot be blamed for changes in dietary patterns,

but must be considered alongside factors such as education, socioeconomic status, and sociocultural influences.

Assessment of nutrition literacy

The “nutrition information” assessed most often includes information about the Dietary Guidelines for Americans and/or Nutrition Facts label-reading skills (1). However, it remains to be seen whether these two areas alone are enough to get the best feel for an individual’s nutrition literacy. In a 2013 focus group, it was observed that participants found that barriers to correct portion sizes was a “lack of clarity...of suggested serving size guidance” and “quantification habits ingrained from childhood” (24). This finding suggests that assessment of portion size perception may be of use in determining nutrition literacy, although it is not included in some assessment tools.

Current tools available and what is lacking

Few nutrition literacy assessments have been developed, as assessment of nutrition or health literacy is not a common practice among healthcare practitioners. The Newest Vital Sign and the Nutrition Literacy Scale assessment tools examine label-reading skills only and assume that low scores indicate low health literacy (1, 25). Other assessment tools examine perceptions of diet advice given by experts, food groups, and sources of specific nutrients (15, 16), and some even assess knowledge of food preparation methods (17). There have been other questionnaires and assessments validated in certain populations, but no single assessment tool is widely used.

The Nutrition Literacy Assessment Instrument (NLit) developed by Dr. Heather Gibbs attempts to close this gap by validating a tool that measures nutrition knowledge, including how diet and health are related, understanding of macronutrients, portion sizes, label-reading skills, and food groups (19). The NLit is a comprehensive nutrition literacy assessment tool, and

although it is still undergoing research and development it seems to be preferred by registered dietitians over other health literacy assessments (19). Current research is working to validate the NLAI for use in professional settings among varying demographic and clinical populations (19). It is this instrument that will be adapted and validated for use in the Latino population of Kansas City.

Conclusion

Literacy assessments for the Hispanic American population

Although different nutrition literacy assessment tools have been developed and validated for differing populations, such as overweight/obese and low socioeconomic status (1, 16), a literacy assessment targeted to Latinos has not been developed and validated. This is an issue for further development because more and more health education materials are being developed and translated for the Spanish-speaking population as that portion of the greater US population continues to grow. In order to understand nutrition education needs for this population, practitioners must be able to identify the concepts on which to focus that education.

Areas for future research

Further research on and development of nutrition literacy assessments targeted to the Latino population is needed in order to fully understand how nutrition literacy affects the dietary intake of this group. This development must include considerations for health risks for Latinos, traditional and typical dietary choices, and whether the population is proficient with English language. If it is discovered that the population would be served better by an assessment instrument written in Spanish, differences in translation methods must also be considered, as dialects differ greatly between nationalities.

Chapter 3: Methods

Overview

The purpose of this study is to create and validate a translated version of the Nutrition Literacy Assessment Instrument (NLit) for use among the Latino population. The English version of the NLit has been translated, reviewed for content, and pilot tested in representatives of the target population. The end product of this research will be dubbed the Nutrition Literacy Assessment Instrument-Spanish Translation (NLit-S).

Sample

The NLit was translated for use among Latino adults in the Kansas City metro area. Since the greatest proportion of Spanish-speaking adults in Kansas City are of Mexican descent, the instrument has been translated so that it is appropriate for this subset of the population. The target population is adults who are most comfortable communicating in Spanish and are of Mexican heritage.

Ethics

Approval for pilot testing was granted by the University of Kansas Human Subjects Committee.

Procedure

The first task accomplished was the review of the current NLit to check for relevance of food items to the Hispanic community. Some food items, such as green beans and salmon, were substituted for nutritionally-similar foods that are more common in a typical Hispanic diet. In the Household Food Measurement and Consumer Skills sections of the instrument, some of these changes required use of new reference pictures. The goal of this adaptation of the NLit was to ensure that the foods presented in the translated instrument are familiar to the target population

with the hope that it will increase face validity of the translated instrument. A table of the food item adaptations can be viewed in Appendix B.

The second task accomplished was the translation of the instrument into Spanish. The method used for translation is known as Consensus Translation (26-30). With oversight from Dr. Paula Cupertino, the verbal translation was performed independently by two students from Mexico working under Dr. Cupertino. After these two individuals completed their translations, a committee of three native Spanish speakers convened to review and revise the translations and decided on the most appropriate adaptation to use. This method enabled the NLit-S to assess the subdivisions of nutrition literacy in the same manner that they are assessed in the English version.

There was a three-person committee of experts who reviewed the translated instrument. Members of the committee were selected based on their knowledge of nutrition as well as their familiarity with the Latino population's specific dietary practices. The committee made suggestions regarding food substitutions, use of words, grammatical structure, and overall readability. Committee members also reviewed the content of the entire NLit-S and completed the Content Review Survey developed by Dr. Gibbs, which was based on a similar survey previously developed (31). "Relevance" scores were analyzed for content validity; other scores were considered in the revision of the translated instrument.

Once it was ensured that the content was relevant to the Latino population, the NLit-S was pilot tested through Cognitive Interviews conducted with three community representatives. Cognitive interviews were conducted in Spanish by two of the Translation Committee members and the author. After informed consent was received, the interviewee read through the NLit-S and made comments regarding readability of questions, familiarity with food items listed, and

other cultural and language issues. The purpose of cognitive interviewing was to identify how participants interpret and process the information and questions presented (32-34). Cognitive interviews were digitally recorded into audio files for further analysis. Feedback from these interviews was reviewed and considered for guidance in making final revisions.

After final revisions based on advice from experts and from members of the target population, the instrument was assessed for readability on the Fernandez Huerta Readability Test, with an optimal reading level of 6th grade or lower to ensure readability for the majority of the Hispanic population.

Materials

Materials included copies of Dr. Gibbs' Nutrition Literacy Assessment Instrument, as this instrument formed the basis of the work completed. The translation committee had the option of utilizing a Spanish-English dictionary or online database, such as www.wordreference.com or similar. Three copies of the Translated Instrument and three copies of the Content Review survey were sent to the three experts performing the content review. Printed copies of the final NLit-S were used for the pilot study among three representatives of the target population. A web-based calculator was used to determine the Fernandez-Huerta Readability score.

Analysis of Data

Content review was performed by three experts on the Translated Instrument. The review assessed relevance and clarity of each item in the NLit-S by using the content review survey. Relevance was statistically analyzed and Scale-Content Validity Index (S-CVI) was determined for each domain of the instrument (35). Relevance scores of three and four were coded as 1 and scores of one and two were coded 0. An average of the relevance score codes for each item was used to determine item Content Validity Index (I-CVI), as outlined by Polit and

Beck (35). S-CVI was also calculated for each domain as a whole by taking an average of the I-CVI scores within each section of the NLit-S (35). An S-CVI score of 0.90 or higher for each domain was needed to ensure that the NLit-S is relevant for the Latino population. Clarity scores, though not analyzed statistically, were used to guide adjustments made to assessment items. Comments made on assessment items were analyzed for content and reviewed individually.

Readability of the NLit-S was determined by the Fernandez Huerta readability test. Ideally, the NLit-S should read at or below the sixth grade reading level. However, a Fernandez-Huerta score corresponding to a seventh grade reading level is generally accepted as appropriate for an adult population (36).

Schedule of Activities

The NLit was adapted for face validity in November, 2014 and a draft of the NLit-S was complete by the end of December 2014. Translation continued in January and the final draft of the NLit-S was complete and sent to the expert review committee on February 16, 2015. The Expert Reviewers had one month to complete the review. Analysis of expert reviews and adjustments made to the NLit-S was completed on March 27, 2015. Cognitive interviews were complete on April 8, 2015 and the results of the interviews were analyzed by April 10, 2015. The Fernandez-Huerta Readability Test was conducted April 14 and final changes to the NLit-S were complete April 15, 2015.

Chapter 4: Results

The NLit-S was determined to have content validity after review by the panel of experts. The pilot study in three representatives from the target population confirmed that the NLit-S is

appropriate for the population. Finally, the NLit-S was written at an appropriate reading level, as determined by the Fernandez Huerta readability test.

Expert Review

Among the three expert reviewers, the NLit-S was well received. Reviewers evaluated each item's relevance and clarity, as well as whether it fit within the domain and was distinct from other questions. Finally, reviewers made suggestions as to which items should be deleted from the instrument. The S-CVI for all domains exceeded the required 0.90 and the entire CVI was 0.96, which indicates strong content validity for each domain and the instrument on the whole. The S-CVI values are listed by domain in Table 1.

Comments made by the expert reviewers were evaluated individually. All comments, compiled by domain and item, can be viewed in Table 2. Adjustments were made to phrasing of questions, word choice, and food items presented based on relevance and clarity ratings and other advice from the experts. The number of items adjusted per domain can be viewed in Table 1, and each adjustment is discussed in further detail following.

The experts advised deletion of some items in the instrument, especially in the Grupos de Alimentos section, where one reviewer recommended deletion of eight of the 16 items. The concern was that though all of the items listed were relevant to the population and clear, they did not provide the best representation of what the Hispanic population regularly eats. For instance, chicken, while a familiar item to Latinos, is not consumed as often as red meat, and so it was advised that this item be deleted. After expert review, two of the items were adjusted for the cognitive interviews, and the cognitive interviews were used to determine course of action on the remaining six items. Therefore, in order to maintain continuity between the NLit-S and the original NLit, no items were deleted. Upon final validation of the NLit, it may be found that

some items are unnecessary, in which case they will be removed from both the original and the translation.

Table 1: S-CVI and adjustments by domain

Domain	S-CVI	Items Adjusted	Items Deleted
Nutrición y Salud	0.97	3	0
Fuentes de Energía en los Alimentos	0.90	1	0
Moderación de Alimentos en el Hogar	1.0	0	0
Etiqueta de Información Nutricional y Aritmética	1.0	7	0
Grupos de Alimentos	0.94	2	0
Habilidades del Consumidor	0.97	0	0
All domains	0.96	13	0

Nutrición y Salud

Three items were adjusted in the Nutrición y Salud domain. In questions one and four, the phrase “dieta saludable” was replaced with “alimentación saludable,” based on comments made by one expert reviewer regarding the negative connotation of the word “dieta.” One answer selection in question ten was modified as well. Selection B, “Jamaica” was determined to be unclear, as the sugar content of this drink varies from household to household, and some Latinos may not add any sugar to their preparation. After expert review, “Horchata” was used instead, as the sugar content of this drink must be high in order to increase palatability. Eight fluid ounces of Rice Dream™ shelf-stable horchata contains 160 calories, 32 grams total carbohydrate, and 18 grams sugars (37), making it relatively energy-dense.

Fuentes de Energía en los Alimentos

Based on the expert review, item seven in this section was adjusted to improve relevance to the target population. The concern was that the breakfast foods listed in the answer selections, while familiar to the Latino population, were not commonly consumed. To accommodate, the “pan con mermelada de fresa” in answer option A was changed to “pan dulce,” which was one of the items that the expert reviewers had strongly recommended be included in the instrument. In

answer option D, “tocino” was changed to “enchiladas de frijol.” The enchiladas are relatively high in carbohydrate, but do not provide as much carbohydrate and sugar as the pan dulce, and the beans have protein; thus, the correct answer to the question remained the same. This item was examined more closely during cognitive interviews.

Moderación de Alimentos en el Hogar

Based on the expert reviews, no changes were made in this section.

Etiqueta de Información Nutricional y Aritmética

The changes made to this section were regarding an inconsistency between the serving size listed on the Nutrition Facts panel and the servings listed in the questions. While questions two, three, four, six, and seven asked about servings in cups, the serving size on the label listed only grams of the food. In order to increase consistency between the information presented and the questions being asked, all instances of the words “taza” or “tazas” were replaced with the terms “ración” or “raciones,” respectively. In keeping with the need for consistency, the words “porciones” and “porción” in questions eight and nine, respectively, were also changed to “raciones” and “ración.” To ensure that these changes served to increase clarity, the interchangeability of the words “porción” and “ración” was discussed during cognitive interviews.

Grupos de Alimentos

There were two items changed in the Grupos de Alimentos section based on the expert reviews. The first was item 12, Jamaica, which was replaced with “Horchata.” Unlike Jamaica, horchata is always made with sugar and would thus be placed in the “Azúcares Añadidos” group. The expert reviewers found item 16, “Tutifrutí” to be unclear, and two out of three reviewers

Table 2: Comments made by expert reviewers, by domain and item.

Domain	Question	*CVI for Relevance	Delete (# yes)	Comments
Nutrición y Salud	1. Alimentos como ____ deben de ser incluidos con frecuencia en una dieta saludable.	1	0	<ul style="list-style-type: none"> Red meat is not discussed in instrucciones & can sometimes be lean. Lean cuts of carne roja exist. It might be more clearly a sub-optimal choice if it were un chuleton (ribeye). (JH) I will use “alimentación saludable” rather than “dieta saludable.” The word “dieta” is associated with “bad tasting food” for this audience. (BM)
	3. Alimentos ricos in nutrientes, como ____ deben de consumirse más seguido.	1	0	<ul style="list-style-type: none"> Two fruit-based selections? (JH) Having juice of orange and orange will confuse some people but you explain it in text 2 prior to quiz. (RB)
	4. Una dieta saludable es baja en grasas saturadas, ____, sodio y alimentos con azúcares añadidos.	1	0	<ul style="list-style-type: none"> Instead of “dieta saludable,” use “alimentación saludable.” (BM) Many people won’t be familiar c niacin—replace with other nutrient choice. (RB)
	7. ¿Cuál comida es la más rica en nutrientes?	0.67	0	<ul style="list-style-type: none"> Healthiness (or unhealthiness) factor of these choices is too subtle—not at 8th grade level. The answers should be reconsidered/redesigned to increase contrast or to add cues to indicate energy excess or high nutrient value. (JH)
	8. El bajo uso de sodio (sal) en la dieta puede reducir ____, lo cual es Bueno para el corazón.	1	0	<ul style="list-style-type: none"> Two seemingly correct answers may confuse/frustrate survey takers. Using four disparate disease states—cancer, diabetes, HTN & goiter may give more accurate evaluation of knowledge. (JH)
	9. Un ejemplo de alimentos con azúcares añadidos es ____.	1	0	<ul style="list-style-type: none"> Some milk such as strawberry or chocolate flavored milks have added sugar. Is this baby carrots or Gerber? Sugar is an ingrediente of flan rather than added to increase flavor—palatability. On the other hand, leche condensada has added sugar & is different from leche entera or leche evaporada o sin grasa. (JH)

S-CVI =0.97

Table 2: Comments made by expert reviewers, by domain and item, continued.

Domain	Question	*CVI for Relevance	Delete (# yes)	Comments
Fuentes de Energía en los Alimentos	10. Un ejemplo de bebidas con un alto nivel de energía es _____.	1	1	<ul style="list-style-type: none"> Agua de Jamaica has nutritional value—vitamin C & flavonoids. This question may give the impression that Jamaica is bad. Coke, Pepsi or some other regular soda would be more worthy beverages of bashing & are regularly consumed all over Latin America. This is an important teachable moment—liquid calories. The question is sound, but select a more worthy villain. (JH) The items in this question are not consumed by most Hispanics. Usually fruit flavored water or cold tea such as Jamaica are prepared at home using a considerable smaller amount of sugar compared to bottled beverages. (BM)
	11. ¿Cuál de las siguientes comidas es más probable que tenga el nivel más alto de sodio (sal)?	1	1	<ul style="list-style-type: none"> Jugo de naranja natural o jugo de naranja recién exprimida. (JH) Although this is important information, for the most part, Hispanics do not buy canned goods often. (BM)
	Is domain comprehensive?			
	2. El/la ____ se encuentra en el jugo de naranja recién hecho como un tipo de carbohidrato.	1	0	<ul style="list-style-type: none"> This [calico] may be confusing because some OJ is fortified c calcium. Should the larger population be aware of folate? Hierro has a positive connection with Vit C (absorption) & is linked with orange juice. Perhaps an alternative to folato. (JH)
	4. ¿Cuál grupo de alimentos proporciona la mayor cantidad de proteína?	1	0	<ul style="list-style-type: none"> How about subbing tilapia for queso? Moms who go to WIC learn that peanut butter is protein. This protein food may confuse them. (JH)
S-CVI=0.90	5. ¿Cuál grupo de alimentos proporciona la mayor cantidad de carbohidratos?	1	0	<ul style="list-style-type: none"> Again, shouldn't these groupings contain more clear-cut examples of macronutrients? <u>Rebanada de pan</u>, arroz, or fideo would be less confusing [in place of leche]. (JH) On letter "A" delete "avena" and "leche." Replace with "tortillas" and "arroz" instead. We don't want people to think that milk and oatmeal are bad for people with diabetes as these are nutrient dense foods. (BM)

Table 2: Comments made by expert reviewers, by domain and item, continued.

Domain	Question	*CVI for Relevance	Delete (# yes)	Comments
Moderación de Alimentos en el Hogar S-CVI=1.0	6. ¿Cuál grupo de alimentos proporciona la mayor cantidad de grasas?	0.67	0	<ul style="list-style-type: none"> [yogurt] sin grasa? [almendras]—fiber, protein, + 6g CHO in 1 oz. (JH)
	7. ¿Cuál desayuno es el más alto en carbohidratos?	0.67	0	<ul style="list-style-type: none"> These are not first choices for breakfast for the Hispanic population. (BM)
	8. Si su doctor le recomendará comer más proteína, ¿Qué alimento es la mejor opción para incrementar proteína y grasa saludable a su dieta?	1	0	<ul style="list-style-type: none"> Suggestion: Si su médico le recomendará comer más grasas saludables, ¿Cuál de los siguientes alimentos se evitara? A. Atún B. Chorizo C. Nogales D, EVOO (JH) Delete the word “atún,” replace with either “pollo” or “pescado.” Since “atún” is canned meat, it is not consumed regularly. (BM)
	9. Si su doctor le recomendará comer menos grasa, ¿Qué alimento comería con menos frecuencia?	0.67	1	<ul style="list-style-type: none"> Well-differentiated [answers]. (JH) This item is not very clear. Bread and potatoes can be low in fat as with baked potatoes and whole grain bread. (BM)
	10. El aceite vegetal es más saludable que la manteca porque:	1	0	<ul style="list-style-type: none"> Me gustaría más si fuera aceite de aceituna o canola, q’ las dos contienen altos niveles de n-3’s. (JH) <i>Translation: I would prefer if it was olive or canola oil, which both contain high levels of Omega-3’s [fatty acids].</i>
	Is domain comprehensive?			<ul style="list-style-type: none"> I would add: tortillas (flour or corn), tamales, frijoles pintos preparados en casa, tostadas, pupusas, carritas, menudo preparado en casa. (BM)
	6. La imagen a la derecha es ½ (media) taza de frijoles negros. Esto es:	1	0	<ul style="list-style-type: none"> This question is relevant but not as necessary as the other items. Not all Hispanics eat black beans. (BM)
	8. La imagen a la izquierda son 3 (tres) onzas de tilapia. Esto es:	1	0	<ul style="list-style-type: none"> This item is also relevant, but not necessarily a problem, as Hispanics will not overeat vegetables. (BM)

Table 2: Comments made by expert reviewers, by domain and item, continued.

Domain	Question	*CVI for Relevance	Delete (# yes)	Comments
Etiqueta de Información Nutricional y Aritmética	Is domain comprehensive?			<ul style="list-style-type: none"> This section is straight forward with no ambiguity or confusing choices. (JH) Yes, the list includes some of the food items rich in carbohydrates that are often seen in Hispanic households. However, I would like to see a picture with the correct serving for tortillas (corn or flour). (BM)
	2. Si usted está tratando de comer menos de 500 mg de sodio (sal) por comida, ¿Cuántas tazas de este alimento se puede usted comer si no consume ninguna otra cosa durante esta comida?	1	0	<ul style="list-style-type: none"> Portion size on label is by wt (gm). Answers are in cups. 240 mL/C = US measure. 228 g in can pozole. (JH) Use “ración,” instead of “taza.” (BM) Label says 228 grams—question uses tazas—suggest change. (RB)
	3. Si usted está limitando su consume total de grasa a 65 gramos por día, y se come una (1) taza de pozole, ¿Cuál es la cantidad más alta de grasa total que se puede comer de otras fuentes de alimentos?	1	0	<ul style="list-style-type: none"> How many cups are in one can? Nutritiondata.com: 1c hominy=165g. 165 x 2 = 330 gm in 2 c / 228 g/serving on label above. So, how does survey population figure this out? (JH) Use “ración” instead of “taza.” (BM) Same as above. (RB)
S-CVI=1.0	4. ¿Cuántos gramos de carbohidratos totales se comería en 2 tazas de pozole?	1	0	<ul style="list-style-type: none"> Use “ración(s)” instead of “taza and tazas.” (BM) Same as above. (RB)
	6. Si usted está tratando de limitar el consume de grasas saturadas a 7 gramos por comida, ¿Cuántas tazas de pozole se puede comer si usted no come ninguna otra cosa en la comida?	1	0	<ul style="list-style-type: none"> Same as previous... cups doesn't work. (JH) Same as above. (RB)
	7. Si usted come ½ taza de este pozole, ¿Cuántos gramos de grasa total se estaría comiendo?	1	0	<ul style="list-style-type: none"> Same as previous—cups doesn't work. (JH) Same as above. (RB)

Table 2: Comments made by expert reviewers, by domain and item, continued.

Domain	Question	*CVI for		Delete	Comments
		Relevance	(# yes)		
Grupos de Alimentos S-CVI=0.94	8. ¿Cuántos gramos de proteína comería si solo come 2 porciones?	1	0	0	<ul style="list-style-type: none"> [porciones]—This works! Except that etiqueta uses the word ración. (JH)
	10. Si su doctor le ha aconsejado limitar el consume total de grasas a 60 gramos por día, ¿Qué porcentaje de su consume diario ha consumido en una porción de este pozole?	1	0	0	<ul style="list-style-type: none"> Is percentage as important as knowing that they shouldn't consume more than 48 gm of fat the rest of the day? (JH) The language must be consistent. The label states "raciones." The question uses "porción." Either word is correct as long as it is used in both (label & question).
	Is the list of items comprehensive?				<ul style="list-style-type: none"> #2, 3, 4, 6, 7 can be repaired by replacing tazas c ración or porción. This section is labeled Aritmética, so my complaints may not be appropriate for the items ranked 1 for clarity. However, it could be those questions will be frustrating for the survey takers & results may not be an accurate measure of relevant/helpful information. (JH) The list covers all of the important items to look for when selecting food items. I will keep items 1, 2, 3, 4, 9, and 10. 5, 6, 7, and 8 are also relevant. (BM)
	3. fideos	1	1	1	<ul style="list-style-type: none"> This is not usually a problem for Hispanics "over-eating" the food item. (BM)
	6. arroz blanco	1	1	1	<ul style="list-style-type: none"> "Arroz blanco" is not as commonly used as fried red rice. (BM)
	8. pollo	1	1	1	
	9. chuleta de cerdo	1	1	1	<ul style="list-style-type: none"> Chuleta de cerdo is not a common item for Hispanics. "Carnitas" is a most common food. (BM)
	11. mantequilla	1	1	1	
	12. Jamaica	1	1	1	<ul style="list-style-type: none"> Not specified as what type of Jamaica (ej. Tea, flavored drink, etc.). (BM)
	15. adrezo para ensalada	1	1	1	<ul style="list-style-type: none"> Not specified as what type of salad dressing. It will be difficult to classify according to ingredients. (BM)
	16. Tutifruti	0	2	2	<ul style="list-style-type: none"> "Tutifruti" is not a clear term. Many food items claim to have this flavor. (BM) I am not familiar c tutifruti. (RB)

Table 2: Comments made by expert reviewers, by domain and item, continued.

Domain	Question	Relevance *CVI for Delete	Relevance (# yes)	Comments
Habilidades del Consumidor	Is the list of items comprehensive for this domain?			<ul style="list-style-type: none"> Other useful items will include: coca-cola or soda, galletas dulce, pastelitos. (BM) Pan dulce? (RB)
	4. ¿Qué bebida proporciona más calorías por cada 8 (ocho) onzas (1 taza en líquido)?	1	0	Need to see label for most people to answer. (RB)
	6. Si el tamaño de las porciones en la imágenes de abajo es igual, ¿Qué alimento ofrece el mayor nivel de nutrición?	0.67	0	
	7. ¿Qué tipo de ensaladas verdes en las imágenes de abajo ofrece el mayor nivel de nutrición?	1	0	This item is useful, but not as relevant as the rest of the list. (BM)
S-CVI=0.97	8. ¿En qué parte de la envoltura del alimento, que se encuentra abajo, se puede encontrar información acerca del contenido de azúcar?	1	0	Good question. (JH)
	10. ¿En qué parte de la envoltura del alimento, que se encuentra abajo, se puede encontrar la mayor información para escoger un alimento con granos integrales?	1	0	Label needs to be Spanish. (RB)
	Is the list of items comprehensive for this domain?			<ul style="list-style-type: none"> The list is comprehensive. I will add processed meats such as ham and bologna. (BM)
	1. Please use this space to provide any additional suggestions or comments.			<ul style="list-style-type: none"> The instrument items are well selected. The majority of the food items are relevant for the target audience. I will include some suggestions below. (BM)
Concluding questions				

Table 2: Comments made by expert reviewers, by domain and item, continued.

Domain	Question	*CVI for		Comments
		Relevance	Delete (# yes)	
	2. Is the phrase “Conocimiento en Nutrición” adequate to convey the idea of Nutrition Literacy? If not, is there a phrase that you would recommend (i.e. “Comprensión,” “Litramento,” “Alfabetización”)?			<ul style="list-style-type: none"> • <u>Comprensión</u> de sounds better to me, less syllables. (JH) • “Información de Nutrición y Alimentos” or “Información de Nutrición” are my suggestions, although “Conocimiento en Nutrición” is also appropriate. (BM) • Ok. (RB)
	3. In the Moderación de Alimentos en el Hogar section, should foods be presented measured in grams, ounces, cups, or some other measurement?			<ul style="list-style-type: none"> • This section worked fine c the measures used in each question. No change necessary. However, in the section Etiqueta/Aritmética, measures were not consistent between the etiqueta & the answers to survey questions. See #s 2, 3, 4, 6, 7. (JH) • All three measurements are familiar to Hispanic audiences. Teaspoons and tablespoons are also appropriate as needed for food items such as salad dressing. (BM) • Maybe list all measures as immigrants may use both systems metrics + US. (RB)
	4. Were there any foods in the instrument that you think would be unfamiliar to the target population? Were there any foods that should be included but aren't?			<ul style="list-style-type: none"> • Horchata could replace flor de jamaica in #10 of Nutrición y Salud. The Wikipedia entry mentions studies of hibiscus that suggest an anti-hypertensive effect that equals or surpasses Lisinopril. Also, Jamaica may contain less CHO than horchata because it lacks the rice water component, and contains flavonoids/antioxidants. Including Jamaica as an example may leave the impression it is bad, when in fact it may be good despite the added sugar. (JH) • All the food items are familiar to Hispanic audience, however, canned foods are not consumed in high quantities. For the most part they cook from scratch using fresh ingredients. Other items to consider will be: tamales, enchiladas, tacos, sweet bread, cookies, soda (coca-cola & pepsi), whole milk, pizza. • Pan dulce—add. I was not familiar c tutifruti. (RB)

suggested deletion. Thus, “tutifruti” was replaced with “Tang de limón,” a common powdered drink mix that contains no real fruit juice and significant added sugar.

Habilidades del Consumidor

Although there were no changes to this section based on the expert reviews, three of the items were examined closely during cognitive interviews, the results of which will be discussed in the next section.

Cognitive Interviews

Cognitive interviews were conducted among three members of the Latino population. Two out of three of these persons were of Mexican heritage, while the third was from Ecuador. One out of three was male, and one out of three had diabetes. Cognitive interviews were structured around the questions that arose from the expert review; therefore, none of the interviews went through the NLit-S from beginning to end. Comments made during the interviews helped guide final adjustments made to the NLit-S. A summary of findings from the Cognitive Interviews can be found in Table 3.

Nutrición y Salud

Two of the items in this section were adjusted based on the cognitive interviews. In item seven, the “rebanada de bolillo” was replaced with “rebanada de pan tostado” in order to increase familiarity among a wider population. Bolillo is a well-known bread among those of Mexican heritage, but other Latinos appear to be less familiar with it. On the other hand, all Latino cultures are familiar with bread, which is why this item was selected.

One expert reviewer was concerned that the baby carrots (las zanahorias bebe) in item nine would cause people to think of baby food, therefore this item was examined among the cognitive interviews. None of the subjects thought of baby food upon reading the phrase

“zanahorias bebe,” and so the selection was left unchanged. Finally, in item eleven, the answer option “jugo de naranja recién hecho” was changed to “jugo de naranja recién exprimido” in order to increase clarity for this item.

Fuentes de Energía en los Alimentos

There were several changes made to this section based on feedback during cognitive interviews. In items one, four, and ten, vegetable oil was changed back to olive oil, as it is in the English version of the NLit. The subjects in the cognitive interviews were familiar with olive oil and reported frequently using it for cooking. For items one and four, this change was made largely to maintain consistency between the NLit and the NLit-S; in item ten, the change served the dual purpose of increasing the clarity of the question.

Item seven presented a unique challenge, as many of the most typical Latino breakfasts are high in carbohydrate. The subjects interviewed debated between the pan dulce and the enchiladas de frijol because of the high carbohydrate content of the tortillas used to make the enchiladas. Therefore, the enchiladas de frijol were ultimately changed to half a cup of beans. Although beans are an excellent source of protein, they also contain carbohydrate. However two slices of pan dulce will remain the correct answer because of the high sugar content.

One reviewer was concerned that the tuna listed in item nine would be an unfamiliar food, as most Hispanics do not consume many canned products and fresh tuna is not commonly eaten. Based on the results of the cognitive interviews, however, this concern was unfounded. All three of the cognitive interviews were familiar with canned tuna, and two of them cited it as being a healthy food choice based on tuna’s high concentration of omega-3 fatty acids. Therefore “atún” was left as it is.

Moderación de Alimentos en el Hogar

The researcher's concern in this section was the familiarity with utilizing cups and ounces as serving sizes among this population and whether it would be better to use metric serving sizes instead. Though the expert reviewers stated that Latinos are familiar with both systems of measurement, this question was also addressed with one subject during cognitive interviews. This subject stated that all of the measurements listed were familiar and that no changes were necessary. Therefore, no alterations were made to this section.

Etiqueta de Información Nutricional y Aritmética

The main concern in this section was whether the words “porción” and “ración” have different connotations in Spanish, as the words “portion” and “serving” do in English. The two subjects asked about this problem during the cognitive interviews stated that “porción” and “ración” both meant “the amount that will be served.” With this feedback, no alterations were made to this section following cognitive interviews.

Grupos de Alimentos

One expert reviewer recommended deletion of eight of the items listed in this section with the basis that many of these items were not representative of a typical Hispanic diet. This question was addressed during the cognitive interviews; all three of the subjects were familiar with all of the items listed, even though they are perhaps not the foods they personally consume on a day-to-day basis. One subject stated that these items were probably consumed within the last month, and that all are consumed regularly by the Latino population. Given these findings, the section was unaltered following cognitive interviews.

Habilidades del Consumidor

Concern was expressed during expert review that the frozen potatoes in item six would be

Table 3: Summary of findings from Cognitive Interviews

Domain	Specific Questions	Response Themes	Actions Taken
Nutrición y Salud	Item 7 Are all foods listed familiar?	All food items are familiar, but not necessarily consumed frequently. One subject was not familiar with the rebanada de bolillo.	Rebanada de bolillo was changed to rebanada de pan tostado in order to increase relevance to a wider population
	Item 9 What comes to mind with the phrase “zanahorias bebe,” baby carrots or baby food? Are all foods listed familiar?	Subjects did not think of baby food upon reading “zanahorias bebe.” All food items are familiar.	None
	Item 11 What would be the best way to say “fresh-squeezed orange juice?” Are all foods listed familiar?	The phrases “jugo de naranja recién hecho,” “jugo de naranja recién exprimido,” and “jugo de naranja natural” have the same connotations, although one subject suggested not to use “natural.” All food items are familiar.	“Recién hecho” was changed to “recién exprimido.”
Fuentes de Energía en los Alimentos	Item 6 Is the question clear? Are all foods listed familiar?	The question is clear and all foods listed are familiar.	None
	Item 7 Are the foods listed familiar? Are they common breakfast foods? To what food can we change enchiladas de frijol to increase clarity?	All food items are familiar and are common breakfast foods. The tortillas used to make enchiladas caused confusion on what answer would be correct. One subject recommended changing enchiladas to whole-grain bread; one subject recommended using beans or hard-boiled eggs; one subject was unsure.	Enchiladas de frijol was changed to ½ cup beans in order to increase clarity.

Table 3: Summary of findings from Cognitive Interviews

	Item 8 Are all foods familiar? Does “atún” give the impression of a healthy or unhealthy food item?	All foods are familiar. “Atún” brings canned tuna to mind, which is considered healthy. Two out of three subjects cited omega-3 fatty acids as the healthy component of canned tuna.	None
	Item 9 Is the question clear? Are all foods familiar?	The question is clear and all foods are familiar.	None
	Item 10 Would clarity be improved by using olive oil instead of vegetable oil in the question? Are all foods listed familiar?	Clarity would be improved by using olive oil instead of vegetable oil in the question. All foods are familiar.	“Aceite vegetal” was changed to “aceite de oliva” in order to increase clarity.
Moderación de Alimentos en el Hogar	Are the measurements used in this section (cups, ounces, fluid ounces) familiar? Would a different measurement system (grams, milliliters) increase clarity?	The measurements used in this section are familiar.	None
Etiqueta de Información Nutricional y Aritmética	Are the questions clear? Do the terms “porción” and “ración” mean the same thing?	The questions are clear. The terms “porción” and “ración” both indicate the amount of food that will be served—no difference in connotation.	None
Grupos de Alimentos	Horchata Is this item familiar? In what category/categories would this item be placed?	One subject struggled with Horchata because the drink has a different purpose in that subject’s home country. The other two subjects were both aware of the drink’s high sugar content.	None

Table 3: Summary of findings from Cognitive Interviews

	Tang de limón Is the item familiar? In what category/categories would this item be placed? Are all food items familiar?	All subjects were familiar with this item and placed it immediately in the Added Sugars category.	None
	Item 6 Are the foods pictured familiar?	All foods are familiar and eaten frequently among the Latino population.	None
	Item 7 Are the foods pictured familiar? Would the question be clearer if kale was replaced by spinach?	Frozen potatoes are not commonly consumed, but all subjects were familiar with the product. Both subjects asked about kale had tried kale before, but neither considered it healthier than iceberg lettuce. The question would be clearer if spinach were used instead of kale.	None Col rizada was replaced by Espinacas.
	Item 8 Would it be more beneficial if the labels pictured were in Spanish, or can the question be answered based on the concept alone?	The question can be answered based on the concept alone, but it would be more helpful to have the labels in Spanish, especially for those who understand very little English.	The photo of the Nutrition Facts panel was replaced with similar in Spanish. The caption for this photo was changed to “Datos de información nutricional.” A product containing a “No Sugar Added” claim in Spanish was not available.
Habilidades del Consumidor	Item 10 Would it be more beneficial if the labels pictured were in Spanish, or can the question be answered based on the concept alone?	The question can be answered based on the concept alone, but it would be more helpful to have the labels in Spanish, especially for those who understand very little English.	The photos were replaced with similar in Spanish.

unfamiliar among the target population. However, those interviewed stated that they had seen the frozen potatoes in the grocery store and two of them had purchased them. All three subjects selected fresh potatoes as the healthiest option, therefore the question remained unaltered.

In item seven, kale was changed to spinach. Although the two subjects that were asked about kale had both tried the vegetable, both selected answer C as correct (kale and iceberg lettuce are the same in nutritional value). One of the subjects stated that if kale was changed to spinach, the correct answer to the question would be the spinach.

In items eight and ten, the subjects recommended that the labels pictured be written in Spanish in order to improve clarity, especially among those of the target population who speak very little English. Therefore, new photos of food labels in English and Spanish were taken to replace the English ones. The researcher was unable to replace the “No Sugar Added” claim with a Spanish version, but did not find a ‘no sugar added’ chocolate drink mix that had a Nutrition Facts Panel in Spanish. In addition, the phrase “panel de información nutricional” in item eight was changed to “datos de información nutricional” in order to increase clarity.

Fernandez-Huerta Readability Test

The Fernandez-Huerta Readability test is adapted from the Flesch Reading Ease test and can be used to assess the reading level of a Spanish document or text (38). In this index, which can be viewed in Table 4 (36), a lower score indicates a difficult text. Reading level is calculated for each 100-word block of text using the following formula:

$$206.84 - (0.60 * P) - (1.02 * F)$$

where P equals the number of syllables per 100 words and F equals the number of sentences per 100 words (38).

A score of 70 or higher is reported to be appropriate for a general adult population (32).

For the purposes of this research, a score of 70-79 was deemed appropriate, while a score of 80 or higher was deemed ideal.

Table 4: Fernandez-Huerta Readability Scores

Index Score	Ease of Readability	Grade Level
0-30	Very difficult	Collegiate level
30-50	Difficult	13-16
50-60	Relatively difficult	10-12
60-70	Normal	8-9
70-80	Relatively easy	7
80-90	Easy	6
90+	Very easy	5

The score was found using an online calculator (36). In order to achieve the most accurate results, only full sentences were included in the readability calculation. Correct answers were inserted on any fill-in-the-blank test items before including them in the readability calculation. With these adjustments made, the Fernandez-Huerta Readability score was 77.2, indicating a seventh grade reading level, which was deemed appropriate, though not ideal, for the target population.

Chapter 5: Discussion

Conclusions and Implications

Research has shown that Hispanic Americans have the lowest rates of health literacy (2). Data on nutrition literacy rates in this population is not available. The intent of this research was to develop a tool that is relevant to Latinos that will aid in the assessment of nutrition literacy. Gaining an understanding of nutrition literacy among this population will aid in the development of programs, services, and tools that will increase health and nutrition knowledge and thereby drive improvements in eating and self-care habits.

After adjustments to the food items presented and translation, the NLit-S was determined by expert reviewers to be relevant to the target population. Comments made by the panel of

expert reviewers helped to guide further editing prior to pilot testing among members of the Latino community. Pilot testing through cognitive interviewing further affirmed the relevance and clarity of the NLit-S and helped to guide final adjustments to the phrasing of questions and responses and to the food items presented throughout. The final version of the NLit-S was assessed for readability using the Fernandez-Huerta Readability test and determined to have an appropriate reading level for the target population.

Upon conclusion of this research, a Spanish version of the Nutrition Literacy Assessment Instrument is available for further pilot testing, with the hope that it will be determined valid for the assessment of nutrition literacy among the Latino population of the Kansas City Metro area. The NLit-S is the first of its kind and therefore fills a gap in literature related to nutrition literacy among disparate populations. This instrument could potentially be used to gather data on current nutrition literacy rates among Latinos for comparison to other groups, as well as for the collection of other epidemiological data.

Limitations

There are twenty countries in the world for which Spanish is the official language, and people in each country speaks one or more dialects (39). These dialects vary largely based on country of origin and even region within one country, making it impossible to create a text in Spanish that will be culturally relevant to all persons of Latin descent (40, 41). This instrument was developed for individuals of Mexican descent, which is the largest subset of the Latino population in the Kansas City metro area. This may affect the utilization of the NLit-S in practice, as some of the foods or phrases used may be less familiar to those of differing heritage. However, it is expected that the NLit-S will be understood by the majority of Latinos in Kansas City, even if all of the food items and phrases are not totally representative of the norms of other

subsets of the population. Adapting the instrument for exclusive use in another subset of the Hispanic community could be easily accomplished.

A further limitation to this study was that the author was not bilingual. This limitation was overcome largely by working with a team of three persons who were of Latin American heritage; two from Mexico and one from Colombia. Future utilization of the NLit-S will require that researchers are fluent in Spanish in order to properly administer the NLit-S and be able to answer any questions from research participants.

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Appendix A – Comparison of Nutrition Literacy Assessment Tools

Assessment	Domain Addressed						
	Numeracy	Sources of Nutrients	Food Groups	Impact on Health	Food Measurements/Portion Sizes	Consumer Skills	Food Preparation Methods
Short Assessment of Health Literacy for Spanish-Speaking Adults—SAHLSA ^{†‡} (18)							
Rapid Estimate of Adult Literacy in Medicine—REALM [§] (19)							
Diabetes Numeracy Test ^{†§}	•						
Nutrition Literacy Scale (19, 25)	•						
Newest Vital Sign [†] (1)	•						
Questionnaire assessment of nutrition knowledge* (17)						•	•
Nutrition Knowledge Questionnaire [§] (16)	•	•				•	
Nutrition Literacy Assessment Instrument—NLit (19)	•	•	•	•	•	•	

[†]This assessment is available in Spanish

[‡]This assessment measures health literacy only

[§]This assessment is disease-specific

*The questionnaire assessment of nutrition knowledge developed by Anderson and colleagues does not appear to have a formal title that the author of this paper could discern.

Appendix B – Adjustments Made to Food Items

Domain	Item	Original Food	Preliminary Adjustment	Spanish Translation	Post-Expert Review	Post-Cognitive Interview	Final Food
Nutrition and Health/Nutrición y Salud	7	Spaghetti with meat sauce	Arroz con pollo	Arroz con pollo			Arroz con pollo
		Garlic bread	bolillo	Una rebanada de bolillo		toasted bread	Una rebanada de pan tostado
		Green beans	Lima beans	habas hervidas			habas hervidas
	9	Chocolate pudding	Flan	El flan			El flan
	10	Lemonade	Jamaica	Jamaica	Horchata		Horchata
Energy Sources in Food/Fuentes de Energía en los Alimentos	11	Orange juice		Jugo de naranja recién hecho		Jugo de naranja recién exprimido	Jugo de naranja recién exprimido
	1	Olive oil	Vegetable oil	Aceite vegetal		Olive oil	Aceite de oliva
	4	Olive oil	Vegetable oil	Aceite vegetal		Olive oil	Aceite de oliva
	6	Pear	mango	mango			mango
		margarine	shortening	manteca			manteca
	7	Toast with strawberry jam		Pan tostado con mermelada de fresa	pan dulce		pan dulce
		Bacon		Tocino	Enchiladas de frijol	1/2 c beans	1/2 taza de frijoles
	8	Salmon	Tuna	Atún			Atún
	10	Olive oil	Vegetable oil	Aceite vegetal		Olive oil	Aceite de oliva

Household Food Measurement/Moderación de Alimentos en el Hogar	8	Salmon	Tilapia	Tilapia		Tilapia		Tilapia
	2	Macaroni and cheese	Pozole	Pozole		Pozole		Pozole
	3	Macaroni and cheese	Pozole	Pozole		Pozole		Pozole
	4	Macaroni and cheese	Pozole	Pozole		Pozole		Pozole
	5	Macaroni and cheese	Pozole	Pozole		Pozole		Pozole
	6	Macaroni and cheese	Pozole	Pozole		Pozole		Pozole
	7	Macaroni and cheese	Pozole	Pozole		Pozole		Pozole
	9	Macaroni and cheese	Pozole	Pozole		Pozole		Pozole
	10	Macaroni and cheese	Pozole	Pozole		Pozole		Pozole
		Lemonade	Jamaica	Jamaica		Horchata		Horchata
Food Groups/Grupos de Alimentos		Fruit Punch	Tutifruti	Tutifruti		Tang de limón		Tang de limón
	5	Canned green beans	Canned corn	Elotes enlatados				Elotes enlatados
Consumer Skills/Habilidades del Consumidor		Frozen green beans	Frozen corn	Elotes congelados				Elotes congelados
	7	Kale		La col rizada		Spinach		Espinacas
		Blueberries	Pineapple	Piña				Piña
	9	Berry Juice	Pineapple juice	Jugo de piña				Jugo de piña